New insights into the conserved mechanism of pluripotency maintenance.

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Public Summary:
Pluripotent stem cells provide a powerful tool for both basic and translational research. The establishment and maintenance of pluripotent stem cells that can transmit through germline after re-introduction back to embryos, however, have only succeeded in the mouse and rat. From in vivo studies on pluripotency during embryogenesis and in vitro studies on existing pluripotent stem cells, several mechanisms have been uncovered for maintenance of pluripotent states. Current clues strongly indicate that such mechanisms are likely conserved among different species. A better understanding of how these mechanisms work together to control cell fate choice will guide future research in both stem cell biology and regenerative medicine. In this review, we discuss recent findings about the mechanisms that maintain the pluripotent state in vitro.

Scientific Abstract:
Pluripotent stem cells provide a powerful tool for both basic and translational research. The establishment and maintenance of germline-competent pluripotent stem cells in vitro, however, have only succeeded in the mouse and rat. From in vivo studies on pluripotency during embryogenesis and in vitro studies on existing pluripotent stem cells, several mechanisms have been uncovered for maintenance of both the naive and the primed pluripotent states. Current clues strongly indicate that such mechanisms are likely conserved among different species. A better understanding of how these mechanisms work together to control cell fate choice will guide future research in both stem cell biology and regenerative medicine.